

621.319

APRIL, 1897.

Electrical Materials.

MOULDED MICA

TROLLEY LINE INSULATORS,
WEATHER-PROOF SOCKETS, ETC.

VULCABESTON

CONTROLLER PARTS,
FIELD SPOOLS, BUSHINGS, ETC.

ELECTRIC CAR HEATERS,

ELECTROTHERMS.

H. W. JOHNS M'F'G CO.,

170-172 NORTH 4th ST., PHILADELPHIA.

NEW YORK

CHICAGO

PHILADELPHIA

BOSTON

LONDON

THE "H. W. J." ELECTRIC CAR HEATER.

(PATENTED.)



The construction of this Heater secures simplicity, effectiveness, durability and economy. The resistance wire is not liable to become oxidized, as it is effectually protected from the atmosphere by being covered with Asbestos, which forms a complete electrical insulation.

The wire is first wound with Asbestos thread and then woven into cloth with an Asbestos warp. The Heater thus formed is fastened by an insulating cement to a sheet of Asbestos Mill-board, which forms its support. The whole is then enclosed in a neat perforated steel casing, as shown in the illustration. The Heater will be furnished japanned, gilded or silvered, as desired.

Several important improvements are attained in the Heater; as the insulated wire folds back upon itself, forming a U shaped loop, there are no coils to short circuit when expanded by heat, or to break when contracted by cold. There is a free circulation of air over all the heated surfaces; the Heater is installed so that its back is about half an inch in front of the panels below the seat.

As these Heaters are attached to the panels by screws only, there is no mutilation of the wood work of the car.

The usual car equipment consists of 6 or 8 Heaters, arranged to produce a uniformly distributed temperature

throughout the car, without requiring an excessively high local temperature in the Heaters themselves.

The Heaters are controlled by a patented knife switch, which can be adjusted to give three different degrees of heat.



At No. 1 for average conditions the lowest temperature is generated with from 3 to 4 amperes; at No. 2, a medium temperature is produced with from 5 to 6 amperes; and at No. 3, a maximum with an average of 8 to 10 amperes.



Great simplicity is secured by this method, making it practical for any intelligent person to properly regulate the heat.

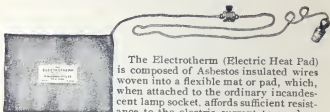
See Complete Descriptive Catalogue, "H. W. J. Electric Heaters,"

The

ELECTROTHERM. TRADE MARK

REGISTERED MARCH 19TH, 1905

PATENTED.



The Electrotherm (Electric Heat Pad) is composed of Asbestos insulated wires woven into a flexible mat or pad, which, when attached to the ordinary incandescent lamp socket, affords sufficient resistance to the electric current to produce a constant and uniform degree of heat. It is of great value to invalids and to physicians and nurses as a substitute for the various troublesome methods of applying and maintaining artificial heat in local applications and upon the operating table; it is also useful for various household purposes, such as warming beds and dishes, and as a foot-warmer.

The Electrotherm is so simply devised, that it can be operated by anyone. It is made for any voltage from 5 to 125 volts, and can be used with either direct or alternating current. A switch is provided for regulating the temperature to any required degree, and, to prevent the possibility of accidental overheating, a sensitive thermostat or temperature regulator is incorporated in the mat, which automatically interrupts the current and operates to keep the temperature within a prescribed limit.

The switch key is arrow shaped and the switch is furnished with metal points, indicating the different degrees of heat, so that it may be operated without the aid of a light.

For general use the Electrotherm is supplied in pads 11 x 15 inches, $\frac{1}{4}$ inch thick, with regulating switch, plug and 15 feet of conducting cord, as follows:

- No. 1, For ordinary domestic use, to replace hot water bottles, etc., with washable slip cover, weight about 11 oz., price.....\$7.50
- No. 2, Specially for Moist Heat, covering of rubber, weight about 1 lb., price..... 7.50
- No. 3, Foot Warmer, covered with cane webbing, price 5.00

See Complete Descriptive Pamphlet on the Electrotherm.

VULCABESTON.

(PATENTED.)

Vulcabeston is composed principally of Asbestos and India Rubber, vulcanized. It is exceedingly tough and strong, dense, practically non-absorbent, resists heat to a high degree, possesses great mechanical resistance to blows and pressure, and is readily manufactured in the forms most useful for electrical purposes.

Vulcabeston is acknowledged to be the standard insulating material for dynamos, motors, arc lamps, converters, street car controllers, switches, rheostats, thermostats, and various forms of electrical apparatus. Its qualities recommend it for such insulating parts as magnet spools, bushings, washers, commutator rings and sleeves, controller parts, and numerous irregular shapes for special requirements. One of the most valuable uses of Vulcabeston is for the covering of armatures, for which it affords the most perfect insulation known.

Vulcabeston Packing, for steam and other purposes, is also a standard article. This is composed materially as above described, with the addition of lubricants, which render it pliable and yielding.

For further description and prices, see special pamphlet.



(PATENTED.)

FOR ELECTRICAL PURPOSES.

As this material is moulded into the various forms in which it is required, the drilling and turning necessary in most of the materials now used for electrical work are avoided.

Prices will be furnished upon application accompanied with full particulars.

Samples for testing furnished upon request.

VULCABESTON INSULATING SHEETS.

We supply Vulcabeston in sheets, 34x34 in., and any desired thickness from $\frac{1}{8}$ inch to one inch.

$\frac{1}{8}$ in. thick and upward, per lb.....	\$ 80
$\frac{1}{16}$ in. thick and less than $\frac{1}{8}$, per lb... ..	1.10
$\frac{1}{32}$ in. thick and less than $\frac{1}{16}$, per lb.....	1.50
Less than $\frac{1}{32}$ in., sheets 12x12 in., per sheet.....	.40

The approximate weights, per sheet, are as follows .

$\frac{1}{8}$ inch, 2 $\frac{1}{4}$ lbs.	$\frac{1}{16}$ inch, 13 lbs.
$\frac{1}{16}$ " 5 "	$\frac{1}{32}$ " 16 "
$\frac{1}{32}$ " 6 "	$\frac{1}{64}$ " 24 "
$\frac{1}{64}$ " 8 "	$\frac{1}{128}$ " 30 "

These insulating sheets are used for lining cut-out boxes and rheostats, for switch bases, insulating armature grooves and sections, for fire-proofing electrical apparatus, etc.

VULCABESTON FIELD MAGNET SPOOLS.

FOR GENERATORS AND MOTORS.



Vulcabeston Magnet Spools are among our most valuable products. They consist entirely of an insulating material, and therefore possess advantages not found in insulated metal spools. Vulcabeston has proved its superiority for this purpose. It is strong, tough and durable, and moisture does not readily condense upon its surfaces. The spools are very light in weight, are perfect in dimension and finish, and occupy a minimum of the space available for the magnet wire. Many thousand Vulcabeston spools are used in stationary and street car motors.

Improved facilities and long experience enable us to furnish Vulcabeston spools for all purposes, superior in quality and finish to any produced heretofore.

VULCABESTON ARC LAMP INSULATION.

Vulcabeston bushings, washers, spools and special parts have been very generally used in arc lamps, owing to the toughness, durability, and heat-resisting qualities of the material.

Vulcabeston is especially useful for the regulator spools and plungers in alternating arc lamp apparatus, as the material is practically unaffected by the heat of induction, and the bore and insulated core of the plunger offer perfectly smooth working surfaces, thus assuring smoothness and nicety of regulation.

Prices furnished upon receipt of particulars.

VULCABESTON CONTROLLER PARTS.



One of the most noteworthy acknowledgments of the superiority and practical ability of Vulcabeston to meet the severest requirements has been its unanimous adoption for the complete insulation of the

Street Car Controllers of the several manufacturers.

COMMUTATOR RINGS AND SLEEVES.

These parts are largely used for the insulation of dynamos and motors and are among our most valuable products.

VULCABESTON BUSHINGS, WASHERS, &c.

Vulcabeston is tough and strong, neither swells nor shrinks, is exceptionally heat-proof and is very durable. For these reasons it is peculiarly valuable for brush holder and other bushings, washers and other parts in dynamos, motors, arc lamps, and electrical apparatus, where the insulation is subject to high temperatures and mechanical strain.



For prices see following pages

VULCABESTON CONTROLLER AND MOTOR PARTS.

We make a specialty of furnishing Railroad Companies and others with Vulcabeston pieces after their own designs. Estimates furnished for special commutator rings, brush-holder bushings, washers, field spools, controller parts, insulating pieces for special requirements, &c.

**WESTINGHOUSE
VULCABESTON CONTROLLER PARTS.**





No. 14 CONTROLLER PARTS.

	P 145		P 146		P 149		P 151
P 145		P 151					

"D" CONTROLLER PARTS.

	P 100		P 101		P 104
P 100, Vulcabeston Disc.....					
P 101, " Partition.....					
P 104, " Plate.....					

"G" CONTROLLER PARTS.

	P 100		P 101		P 103		P 104
P 100, Vulcabeston Disc.....							
P 101, " Partition.....							
P 103, " Base-board.....							
P 104, " Plate ..							

CONTACT RING FOR NO. 14 AND NO. 28 CONTROLLERS.

To replace porcelain. Furnished plain as per cut. Mould No. 695, Vulcabeston Contact Ring... \$1.35

**WESTINGHOUSE PARTS FOR NO. 3 AND NO. 12 MOTORS.**

P 950, Vulcabeston Brush Holder Bushing, to insulate arm from motor casting, per set of two halves.... \$1.74



P 3, Vulcabeston Ring for end of commutator..... \$1.80



VULCABESTON PARTS FOR CONTROLLERS OF THE GENERAL ELECTRIC CO.

For Type "E" Controller.



S 136, Wide Strip.....	.90
S 137, Narrow " .....	.45
S 138, Arc Arrestors.....	.27
S 139, End Shields.....	.56
S 140, Spool.....	1.80

For Type "K" Controller.



S 148, Spool.....	1 70
S 153, Broad Strip.....	1.35
S 154 Narrow " .....	.50
S 155, Arc Arrestors.....	.36
No. 451 1/2, Cylinder Contact Ring.....	.36

VULCABESTON PARTS FOR MOTORS OF THE GENERAL ELECTRIC CO.

BRUSH HOLDER BUSHINGS.

S 5058, For Nos. 6, 8 and 14 Edison Motors... \$.70



COMMUTATOR RINGS FOR G. E. 800 MOTORS.

Mould No. 671, for ring armature..... \$2.00

" " 715 " drum " 1.50



Vulcabeston Field Magnet Spools for Sprague & Edison Street Car Motors.

S 5002, Spool for No. 6,	S. C. Motors.....	\$2.50
S 5003, " " " 8,	" "	2.50
S 5005, " " " 12, N. S.,	" "	9 60
S 5006, " " " 14, O. S.,	" "	7 90
S 5007, " " " 14, N. S.,	" "	6.75
S 5005, " " " 16, N. S.,	" "	9.60

MORE THAN A MILLION PIECES

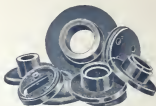
of Vulcabeston in all shapes and sizes are in use in the street railway motors, controllers, generators, arc lamps, and in electrical apparatus generally throughout the United States and foreign countries. There is no electric insulating material which to the same degree possesses the peculiar and superior qualifications of Vulcabeston for resisting heat and mechanical strains during prolonged service.

For ten years Vulcabeston has occupied the position as the Standard insulation for a wide variety of purposes under the severest conditions.

All pieces not listed made to order. Prices quoted on application.

MOULDED MICA.

SPECIAL PIECES.



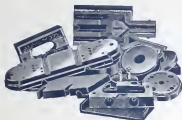
Moulded Mica, in addition to its widespread use in the insulation of trolley lines during the past ten years, has also had numerous applications in special form for the insulation of a great variety of electrical apparatus. It is a hard, dense, water-proof compound, moulded under great pressure, and is intrinsically one of the best insulating compounds known for electrical purposes. It is a most suitable and durable material for use in temperatures not over 150° F.

As usually employed in trolley line insulators, Moulded Mica is brown in color ; when made for special purposes it is furnished in black, upon request, and possesses a highly ornamental polish and finish. Parts made of it are, therefore, valuable for assembling with metal and other parts. Metal parts can be most advantageously moulded within this material, the Moulded Mica adhering tenaciously to them.

It is largely used for weather-proof sockets, switch bases, cut-outs, bases for instruments, spools or bobbins, bushings, washers, telephone bases and cases, and similar apparatus ; also for covering the handles of tools, such as screw-drivers and pliers, and many other devices requiring a durable and perfect insulation.

Prices quoted upon receipt of drawing or model.



"MONARCH" INSULATING MATERIAL.**SPECIAL PIECES.**

"Monarch" insulating material, like Moulded Mica, is made in moulds under great pressure, and is suitable for similar purposes. It is a hard, black or red material, composed largely of Asbestos, and has been most successfully used for the moulding of switch blocks, covers, sockets, bushings, thermostat bases, and special pieces requiring accuracy and permanency of dimension and finish. The material is not liable to warp, swell or shrink with ordinary changes of temperature, and is therefore valuable for the above and other purposes. It is suitable for temperatures under 250° F.

Prices quoted upon receipt of drawing or model.

TROLLEY LINE INSULATORS.

"ROUND TOP" HANGER.

(PATENTED.)



An exceedingly strong form of insulator in metal shell, which protects the Moulded Mica insulation from blows of the trolley wheel. The screw stud is $\frac{5}{8}$ inch steel.



This insulator is a standard and has been largely used by prominent street railway companies and engineers.

No. 100, "Round Top," mall. iron shell, without ear...	\$.63
No. 110, "Round Top," brass shell, without ear.....	1.10
No. 112, "Round Top," Feed In Hanger, brass, without ear	1.00

CAMDEN BRACKET BELL.



The construction and insulation of this bell are in all respects similar to the body of the regular "Round Top" hanger. Furnished with $\frac{5}{8}$ inch threads top and bottom.

No. 113, Camden Bracket Bell, mall. iron.....	\$.80
No. 114, " " " " brass.....	1.25

For list of Ears and Mechanical Clips, see pages 20 and 21.

SINGLE GIANT PULL-OVER.

(PATENTED.)



No. 345, Single Giant pull-over, without ear..... \$.75

DOUBLE GIANT PULL-OVER.

(PATENTED.)



No. 355, Double Giant pull-over, without ear.....\$1.35

These pull-overs consist of a substantial malleable iron yoke, adjusting bolt for attaching ear in any desired position, and No. 2 Giant strain insulators for strain-wire attachments. They are used for constructions of the strongest and most permanent character.

For List of Bars and Mechanical Clips, see pages 20 and 21

LINE INSULATORS.

"H. W. J." HANGERS AND PULL-OVERS.



These are smaller and lighter than those of the "J-P" style, and embody all improvements. The plug is perfectly insulated with Moulded Mica. The design of the body provides for an exceptional length of insulating surface. The special nut for tightening and loosening the plug with a wrench, which is certain to operate, is a valuable feature. Plugs furnished with steel bolts. The following prices are based on insulated plugs with steel bolt and special tightening device.



No. 142,	"H. W. J." hanger, galvanized mall. iron body..	61c.
No. 152,	" single pull-over, galvanized.....	61c.
No. 162,	" double " "	68c.
No. 170,	" insulated plug, steel bolt with spcl. nut..	25c.
No. 173,	" brass feed in plug.....	45c.

Above prices do not include Ears.

For list of Ears and Mechanical Clips, see pages 20 and 21.

"J-P" BARN OR BRIDGE HANGER.

Moulded Mica insulated plug. The drop of the trolley wire below the beams is five inches.

No. 65 "J P" Barn Hanger, brass.
without ear.....\$1.05

ELEVATED R. R. OR MINE HANGER.

This hanger is designed so that the cap will fasten on the upper side of its board support, which permits the petticoat and plug to be manipulated from below; the arrangement thus taking up the least possible space. Drop of trolley wire below board about $2\frac{1}{4}$ inches.



No. 77, Mine hanger, regular "J-P" plug; japanned malleable iron.....\$1.25

"ROUND TOP" BARN OR BRIDGE HANGER.

(PATENTED.)



This Barn Hanger embodies the features of the Round Top Hanger and possesses similar advantages. The drop of the trolley wire below the beams is five inches.

No. 208, Round Top Barn Hanger, without ear.....70c.

"J-P" BRACKET ARM HANGERS.



No. 67.



No. 68.

No. 67,	J-P	brass bell and solid sleeve for	1 1/4 in. pipe	.....	\$1.43
No. 67a,	"	" " " " " "	1 1/2 " "	.....	1.50
No. 68,	"	" " " hinged " "	1 1/2 " "	.....	1.52
No. 69,	"	" " " " " "	2 " "	.....	1.58
No. 73,	galv.	" " solid " "	1 1/4 " "	.....	1.21
No. 73a,	"	" " " " " "	1 1/2 " "	.....	1.11
No. 74,	"	" " " hinged " "	1 1/2 " "	.....	1.13
No. 75,	"	" " " " " "	2 " "	.....	1.11

"ROUND TOP" BRACKET ARM HANGERS.



No. 456.



No. 460.

No. 451, hinged sleeve for 1½ inch pipe.....	\$1.17
No. 456, " " for 2 inch pipe.....	1.20
No. 460, solid sleeve for 1¼ inch pipe.....	1.20
No. 461, " " for 1½ inch pipe.....	1.13

Above prices do not include Bars.

For List of Ears and Mechanical Clips, see pages 30 and 31.

CAP AND CONE

FORMS OF INSULATION MADE OF MOULDED MICA.



S 74-S 75



S 103-S 104.

No. 5, S 74 and S 75, $\frac{1}{4}$ in. screw stud.....	60c.
No. 6, S 103 and S 104, " " "	60c.
No. 7, S 103 and S 104, $\frac{3}{8}$ in. " "	60c.

FEED-IN HANGER.



When feed wire is used for span wire.
Consists of uninsulated yoke and ear.

No. 31, Yoke, brass, complete with $\frac{3}{8}$ inch bolt.....	47c.
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EARS.



Our trolley ears for soldering are constructed with deep groove, and thoroughly tinned all over. The deep groove is a valuable feature, as the trolley wire is held with exceptional security. Furnished for 0 and 00 B. & S. wires.

No. 611, Plain Ear, 9 in. long, $\frac{3}{8}$ in. stud (J-P & H.W.J.)..	\$.28
No. 615, " 9 " " $\frac{3}{8}$ " " (st'ght line R.T.) ..	.34
No. 620, " 9 " " $\frac{3}{8}$ " " (pull-over Giant) ..	.34
No. 621, " 15 " " $\frac{3}{8}$ " " (J-P & H.W.J.)..	.38
No. 625, " 15 " " $\frac{3}{8}$ " " (st'ght line R.T.) ..	.43
No. 630, " 15 " " $\frac{3}{8}$ " " (pull-over Giant) ..	.43

STRAIN EAR.



- No. 652, Strain Ear, 15 in. long, $\frac{5}{8}$ -in. stud (Round Top).. 72c.
 No. 653, " " 15 " " " " (J-P & H. W. J.) 65c.

FEED-IN EAR.



- No. 665, Feed-in Ear, 15 in. long, $\frac{5}{8}$ -in. stud (Round Top) 70c.
 No. 666, " " 15 " " " " (J-P & H. W. J.) 67c.

SPLICING EARS.



- No. 680, Splicing Ear, 15 in. long, $\frac{7}{8}$ -in. stud..... 79c.
 No. 682, " 15 " " $\frac{5}{8}$ " " 79c.
 No. 683, " 15 " " $\frac{5}{8}$ " " (J-P & H. W. J.) 74c.

"H. W. J." MECHANICAL CLIP.

(PATENTED.)



This clip consists of a single casting and is easily attached by simply springing the trolley wire into place. It is a cheap and effective device and is not liable to cause sparking.

Its practical value is demonstrated by its general adoption throughout the country.

- No. 710, "H. W. J." Clip, $\frac{7}{8}$ inch stud, brass..... 33c.
 No. 712, " " $\frac{5}{8}$ " " " 33c.

THE PHILADELPHIA BREAK. SECTION INSULATOR.

(PATENTED.)



Has a straight under-run, suitable for high speeds, and a fibre-insulated break over eight inches in the clear. The fibre insulation is $\frac{3}{8}$ inch thick. Provision is made for tap-in wires at each end. It is light in weight and has proved its efficiency on the "line." Weight, $4\frac{1}{2}$ lbs.

No. 955, With $\frac{3}{8}$ inch socket. O B. & S. wire.....	\$5 00
No. 957, " " " OO " "	6.00

CROSSINGS.



Plain brass right angle and adjustable Crossings, light and strong, and simple in construction. Made with straight under-run.

No. 966, Right angle crossing.....	\$4.30
No. 968, Adjustable "	5.15

PHILADELPHIA INSULATED CROSSINGS.

(PATENTED.)



These crossings are insulated in the same efficient manner as the Philadelphia break. They have a straight under-run and require no cutting of the trolley wires.

No. 969, The Phila. right angle insulated crossing. —	\$19.00
No. 972, " " adjustable " "	21.00

GUARD-WIRE INSULATORS.

(PATENTED.)



Moulded Mica and Monarch insulation.

No. 750, Guard-wire hanger..... 20c.

No. 762, Single pull-over..... 20c.

No. 763, Double " 20c.



Porcelain insulators and malleable iron castings.

No. 753, Straight line hanger, porcelain..... 20c.

No. 751, Single guard-wire pull-over, porcelain..... 20c.

No. 752, Double " " " " 20c.

GLOBE STRAIN INSULATORS.

(PATENTED.)

The medium size Globe Strain Insulator is suitable for the lighter guys and the small size for cutting out lengths of guard wire, etc. They are not recommended for the insulation of span wires.



Furnished in "Monarch."

No. 809, Medium Globe Strain, 2 inches diameter..... 30c.

No. 810, Small " " " 1 1/4 " " 25c.

N. B.—The No. 1 and No. 2 Giant Strain Insulators (see pages 26 and 27) have taken the place of the Large Globe formerly sold.

GLOBE STRAIN INSULATOR,**WITH CLEVIS.**

(PATENTED.)



These are the same as the Globe Strains mentioned above made with clevis for attachment to overhead switches, etc.

Furnished in "Monarch."

No. 822, Medium Globe Strain, with clevis..... 50c.

No. 1 GIANT STRAIN FEED-IN INSULATOR.

Consists of a special combination of No. 1 Giant Strain Insulators, thus providing a substantial double insulation when the feed wire is used for the span wire.

No. 844. No. 1 Giant Double Feed-In Insulator..... \$2.25

No. 2 GIANT STRAIN INSULATOR.

(PATENTED.)



This insulator is the same in construction as the No. 1 Giant Strain Insulator. It is smaller in size. Average breaking strain, 5,000 lbs.

No. 826. No. 2 Giant Strain Insulator..... 42c.

No. 823. with $\frac{1}{2}$ -inch nut one end..... 51c.

No. 824. " " both ends..... 51c.

WITH CLEVIS AND LARGE EYE.

No. 845.

No. 846.

No. 825. No. 2 Giant with clevis one end 60c.

No. 828. " " large eye one end..... 69c.

No. 852. " " clevis and large eye..... 81c.

"H. W. J." TOGGLE-CLAMP**FEED WIRE INSULATOR.**

(PATENTED.)



The purpose of this insulator is to enable the feed wire to be attached to the insulator without the use of binding wires, screw caps, or other time consuming devices.

The illustration shows the manner in which the pivoted jaws in sinking under the weight of the wire, automatically clamp the wire with a powerful toggle action which effectually prevents the wire from slipping or chafing. The jaws are three inches long, and furnish a wide, smooth seat for the wire, thus preventing damage to the insulating covering.

The wire is attached to the insulator by dropping it into the jaws, and may be removed at any time by simply lifting it out. This insulator will be furnished for different sizes of wires.

No. 908, Toggle-Clamp insulator for wires $1\frac{1}{4}$ inch
over the insulation (500,000 C. M. wire).... \$.84

FEED-WIRE INSULATORS.



No. 900.



No. 902.



No. 905.



No. 904.

Nos. 900, 901 and 902 are of solid Moulded Mica. Nos. 904, 905 and 906 consist of metal shells insulated with Moulded Mica. Threaded for one inch standard pin.

No. 900. Plain Pole insulator, for 0000 B & S..... 68c.

No. 901, "Top Groove" $1\frac{1}{2}$ in. diameter for 500,000 C. M. 78c.

No. 902, " " $1\frac{1}{4}$ in. " " " " 78c.

No. 904, "Iron-Clad," plain top, for 500,000 C. M..... 63c.

No. 905, " " $1\frac{1}{4}$ inch top groove, for 500,000

C. M..... 63c.

No. 906, "Iron Clad," $\frac{3}{8}$ inch top groove, for 0000 B. & S. 63c.

TROLLEY WIRE SPLICING SLEEVES.



These sleeves enable the linemen to repair a break in five or ten minutes. The joint is a mechanical one, no solder being required.

DIRECTIONS FOR MAKING JOINT.

Insert the ends of the wires in the sleeve, or tube, and push the wedges firmly into place, one wedge only being necessary at each end; let go of wire and the joint is made.

Furnished in all sizes, from No. 4 to 00 wire. Unless otherwise specified, No. 0 B & S., will invariably be sent in filling orders.

K. & I. mechanical splicing sleeve.....75c.

Two wedges only are required for sleeve. Extra wedges \$4.00 per 100.

Eye-Bolts,
Fork-Bolts, porcelain insulated,
Trolley Wheels,

Prices quoted upon
application.

THE GRAUTEN RAIL BOND.

(PATENTED.)



No. 2.



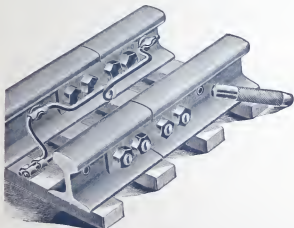
No. 3.

This is a convenient, simple and durable bond, made of composition metal furnished for bonding with oo B. & S. wire. The shank is cup shaped for rivetting and will be made any desired size. Stock sizes $\frac{9}{16}$ and $\frac{3}{4}$ inch diameter of shank.

No. 2, Grauten rail bond, wire connector, per 100.... \$5.65

No. 3, " " " for rail connection, " " ... 7.30

Special prices quoted for quantity.



The cut illustrates the simple and effective application of the bond.

The Grauten bond is giving perfect satisfaction wherever used.

TREE INSULATORS.

(HAWKEN PATENT)

These insulators offer valuable protection against the dangers and losses which result from the abrasion of electric light and feeder wires. They are furnished in wood, in halves, saturated with a preservative compound, and are readily attached to the wire and held in place, as illustrated in the cut. Thousands in use by electric railway and lighting companies.

WOODEN TREE INSULATORS.

(HAWKEN PATENT)



No. 1006, Size, $\frac{3}{4}$ -inch	12 inches long	26c
No. 1007, " $\frac{1}{2}$ "	18 " "	30c
No. 1008, " $\frac{3}{8}$ "	13 $\frac{1}{2}$ " "	28c
No. 1009, " $\frac{1}{2}$ "	18 " "	32c
No. 1010, " $\frac{3}{8}$ "	13 $\frac{1}{2}$ " "	30c
No. 1011, " $\frac{1}{2}$ "	18 " "	33c
No. 1012, " 1 $\frac{1}{8}$ "	13 $\frac{1}{2}$ " "	35c
No. 1013, " 1 $\frac{1}{2}$ "	18 " "	39c

Special sizes and lengths made to order.

Notes. The above sizes of Tree Insulator are usually adapted for the following sizes of insulated wire:

Size $\frac{1}{4}$ inch	for No. 1 B, & 5
" $\frac{3}{8}$ "	" " " " "
" $\frac{1}{2}$ "	" " " " "
" 1 "	" " " " "

INSULATED PLIERS.

Insulated for Messrs. Peck, Stowe & Wilcox, of Southington, Conn.

6 inch Safety Side Cutting Pliers, per doz	\$25.00
7 " " " " " "	33.00
8 " " " " " "	40.00
7 " " " Insulated Gas " " "	15.00

"VULCAN" INSULATED SCREW-DRIVERS.

MANUFACTURED FOR THE CLEMENT MFG CO., NORTHAMPTON, MASS.

Size	2 $\frac{1}{2}$ in	3 $\frac{1}{2}$ in	4 in	5 in	6 in
Price	\$6.00	\$7.00	\$8.00	\$12.00	\$13.50 per dozen

The Moulded Mica with which these tools are insulated is one of the best insulators known.

MOULDED MICA WEATHER-PROOF KEYLESS LAMP SOCKETS.



These sockets are water-proof on top. Furnished either brown or black and with lead covered wires at an additional cost, if desired. Thousands in use in paper mills, breweries, laundries, tunnels and other damp places. They are not recommended for a temperature greater than 125° F. For Thomson-Houston and Westinghouse base only. Leads longer than 24 inches are furnished only with Thomson-Houston base.

Price of Sockets with 6 in. leads..... 25c.

PRICES OF SOCKETS, WITH EXTRA LENGTH WIRES.

(THOMSON-HOUSTON BASE.)

Sockets, with wires 6 inches long, each.....	\$0.25
“ “ “ 12 “ “ “ .....	.27 ½
“ “ “ 18 “ “ “ .....	.30
“ “ “ 24 “ “ “ .....	.35
“ “ “ 30 “ “ “ .....	.40
“ “ “ 3 feet “ “ “ .....	.45
“ “ “ 4 “ “ “ .....	.55
“ “ “ 5 “ “ “ .....	.65
“ “ “ 6 “ “ “ .....	.75
“ “ “ 7 “ “ “ .....	.85
“ “ “ 8 “ “ “ .....	.95
“ “ “ 10 “ “ “	1.15



FOR BRACKET FIXTURE.

Threaded for standard ½-inch pipe. Furnished in brown or black with Thomson-Houston base and 6-inch leads; longer lengths of lamp cord, extra. Price.....40c.

ASBESTOS

Asbestos has had universal application in the electrical, chemical and mechanical arts. It is unique in its fire and acid-proof qualities, which render it peculiarly valuable for many purposes. It is also an insulator of electricity, and in the manufacture of electrical apparatus, such as dynamos, motors, arc lamps, switches, rheostats, etc., its insulating, heat-resisting and fire-proof qualities are utilized to great advantage. For these purposes we furnish Asbestos in the forms of a sheathing or paper, mill-board, tubes, cloth, twine, etc.

Asbestos is also used for fire-proofing woodwork and combustible materials in the vicinity of electric wires and machinery, for lining cut-out and fuse boxes, switches, rheostat cases, etc.

Our long experience in the manufacture of Asbestos specialties with the continued improvement in processes and the invention of new methods and machinery, enable us to furnish a great variety of Asbestos products suitable for special purposes.

For the full list of our Asbestos and other goods, see *Descriptive Price List*.



EXHIBIT AT THE AMERICAN INSTITUTE FAIR, MADISON SQUARE
GARDEN, NEW YORK SEPTEMBER-OCTOBER 1896.



AWARDED MEDALS FOR SUPERIORITY OF MANUFACTURE

H. W. Johns Manufacturing Co.

170-172 NORTH 4th ST., PHILADELPHIA.

NEW YORK 100 William Street

CHICAGO 240-242 Randolph St.

BOSTON 77-79 Pearl Street

LONDON, 88 Leadenhall Street